



A.D. 1854 N° 1785.

SPECIFICATION

OF

SAMUEL FRANKHAM.

—
FURNACES.
—

LONDON:

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1855.



A.D. 1854 N° 1785.

Furnaces.

LETTERS PATENT to Samuel Frankham, of Greenland Place, in the County of Middlesex, Engineer, for the Invention of “**IMPROVED MEANS OF CONSUMING SMOKE AND ECONOMIZING FUEL IN FURNACES.**”

Sealed the 26th January 1855, and dated the 16th August 1854.

PROVISIONAL SPECIFICATION left by the said Samuel Frankham at the Office of the Commissioners of Patents, with his Petition, on the 16th August 1854.

I, SAMUEL FRANKHAM, of Greenland Place, in the County of Middlesex,
5 Engineer, do hereby declare the nature of the said Invention for “**IMPROVED MEANS OF CONSUMING SMOKE AND ECONOMIZING FUEL IN FURNACES**” to be as follows:—

The improved means of consuming smoke and economizing fuel in furnaces, which forms the subject of the present Invention, is more particularly intended
10 to be applied to the furnaces or fire-places of steam boilers, but is also applicable to other furnaces or fire-places. The Invention consists in so constructing the walls of the fire-place that the smoke and combustible vapors from the fuel may be made to pass through a series of openings of moderate size, accompanied by flame from the fire. These openings I propose to make in one of the side
15 walls, and also the end wall of the furnace, and these openings will lead from the fire-place into the flues, and thence to the chimney. The draught from the chimney will of course make the smoke and combustible gases pass through these openings, which, being on a level with or rather below the level of the fuel, will oblige the gases to descend, and be thereby brought in contact with

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the flame of the burning fuel, and be consumed thereby; this operation being further facilitated by the draught causing the flame from the fire to enter the openings into the flues with the combustible gases, and in so doing consume them; thus effectually preventing the emission of smoke from the chimney, and thereby economizing the fuel that is supplied to the fire, as none of the combustible and useful parts of the fuel will be allowed to pass off in the form of vapor unconsumed. It will of course be understood that the precise method of carrying out the Invention will vary, according to the form of the boiler, and the particular purpose to which the furnace is intended to be applied. 5

SPECIFICATION in pursuance of the conditions of the Letters Patent, filed 10 by the said Samuel Frankham in the Great Seal Patent Office on the 15th February 1855.

TO ALL TO WHOM THESE PRESENTS SHALL COME, I, SAMUEL FRANKHAM, of Greenland Place, in the County of Middlesex, Engineer, send greeting. 15

WHEREAS Her most Excellent Majesty Queen Victoria, by Her Letters Patent, bearing date the Sixteenth day of August, in the year of our Lord One thousand eight hundred and fifty-four, in the eighteenth year of Her reign, did, for Herself, Her heirs and successors, give and grant unto me, the said Samuel Frankham, Her special license that I, the said Samuel Frankham, my 20 executors, administrators, and assigns, or such others as I, the said Samuel Frankham, my executors, administrators, and assigns, should at any time agree with, and no others, from time to time and at all times thereafter during the term therein expressed, should and lawfully might make, use, exercise, and vend, within the United Kingdom of Great Britain and Ireland, the Channel 25 Islands, and Isle of Man, an Invention for "**IMPROVED MEANS OF CONSUMING SMOKE AND ECONOMIZING FUEL IN FURNACES**," upon the condition (amongst others) that I, the said Samuel Frankham, by an instrument in writing under my hand and seal, should particularly describe and ascertain the nature of the said Invention, and in what manner the same was to be 30 performed, and cause the same to be filed in the Great Seal Patent Office within six calendar months next and immediately after the date of the said Letters Patent.

NOW KNOW YE, that I, the said Samuel Frankham, do hereby declare the nature of my said Invention, and in what manner the same is to be per- 35 formed, to be particularly described and ascertained in and by the following

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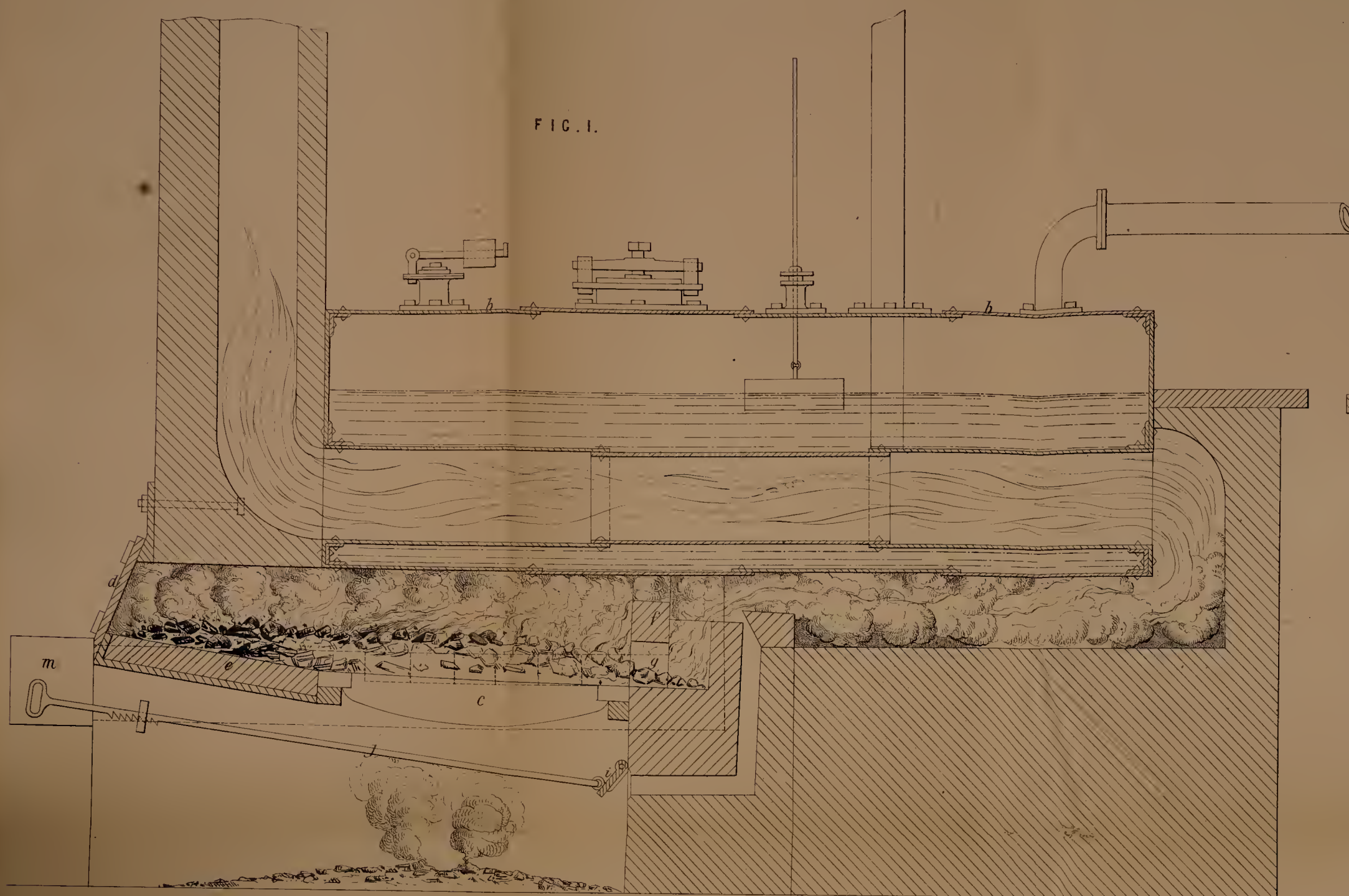


FIG. 2.

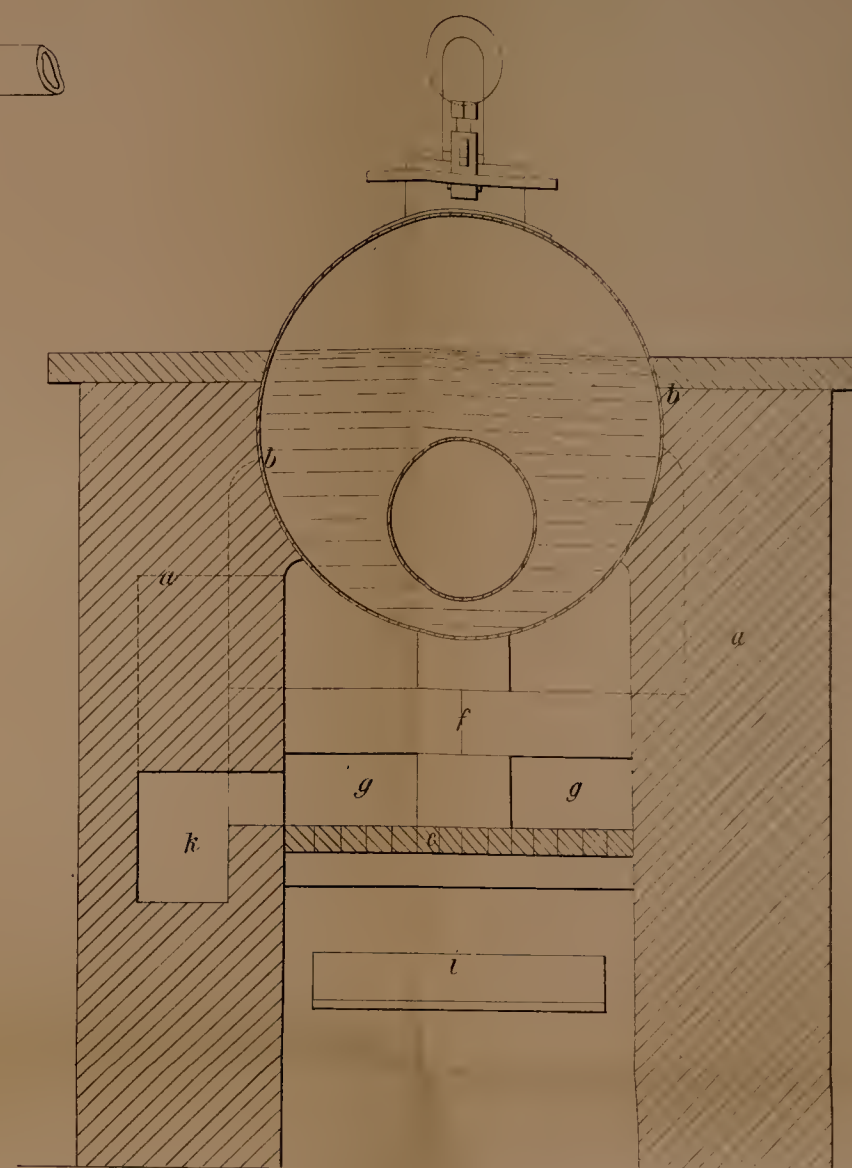
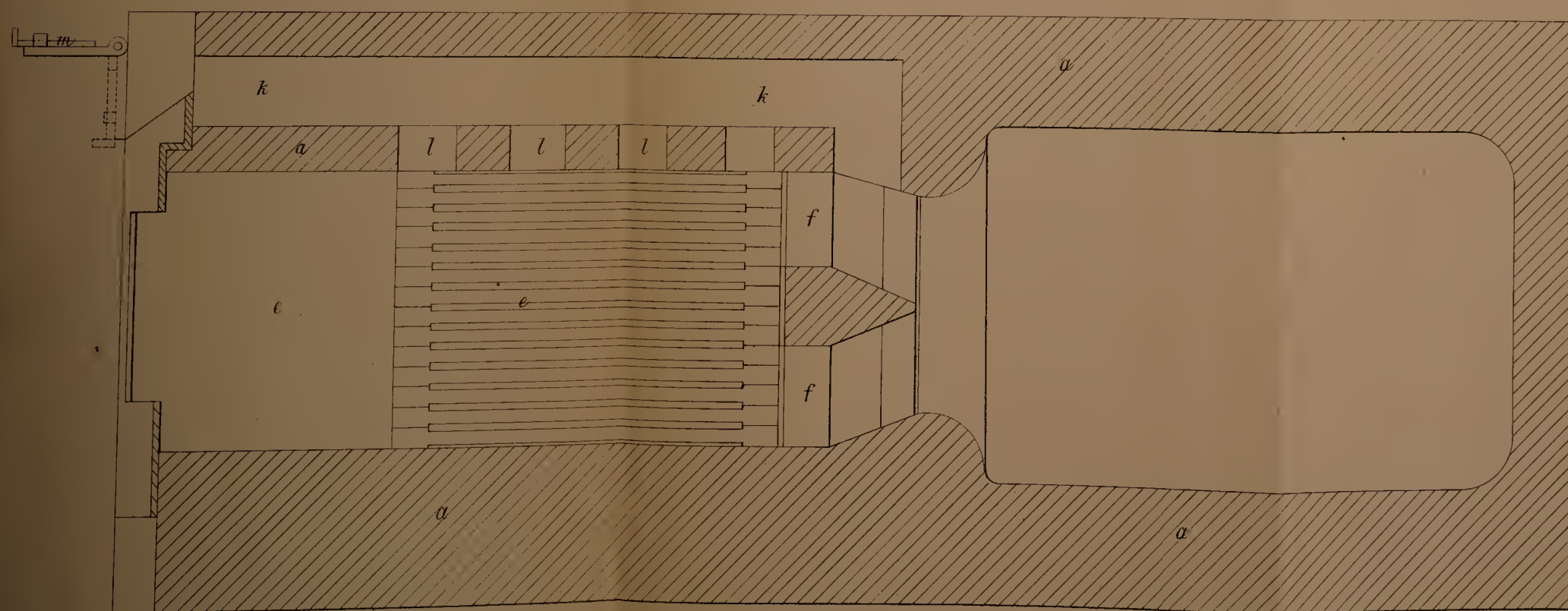


FIG. 3.



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statement, reference being had to the Drawing hereunto annexed, and to the letters and figures marked thereon (that is to say):—

The “Improved Means of Consuming Smoke and Economizing Fuel in Furnaces,” which forms the subject of the present Invention, is more particularly intended to be applied to the furnaces or fire-places of steam boilers, but is also applicable to other furnaces or fire-places.

The Invention consists in so constructing the walls of the fire-place that the smoke and combustible vapours from the fuel may be made to pass through a series of openings of moderate size, and be brought into contact with the flame from the fire.

These openings I propose to make in the side and end walls of the furnace, and these openings will lead from the fire-place into the flues, and from thence to the chimney. The draught from the chimney will of course draw the smoke and combustible gases through these openings, and those which are on a level with or rather below the level of the fuel will oblige the gases to descend, and thereby come in contact with the flame of the burning fuel, and be consumed thereby; this operation being further facilitated by the draught causing the flame from the fire to enter the openings into the flues with the combustible gases, and in so doing consume them; thus effectually preventing the emission of smoke from the chimney, and thereby economizing the fuel that is supplied to the fire, as none of the combustible and useful parts of the fuel will be allowed to pass off in the form of vapour unconsumed.

It will of course be understood that the precise method of carrying out the Invention will vary, according to the form of the boiler, and the particular purpose to which the furnace is intended to be applied.

In the accompanying Drawing I have shewn different views of the furnace of a cylindrical steam boiler, that being a common form of steam boiler; but other forms, such as the waggon shape or tubular boilers, may be heated by furnaces constructed and arranged according to my improvements.

Fig. 1 is a longitudinal vertical section of a cylindrical boiler and its furnace; Fig. 2 is a transverse section of the same; and Fig. 3 is a plan of the furnace or fire-place, the boiler being removed. *a, a*, are the side walls or masonry of the fire-place; *b, b*, the boiler set thereon in the ordinary way, with a flue through it, in order to increase the heating surface, by allowing the flame and heated gases to pass through the interior of the boiler; *c, c*, is the grate of the fire-place or furnace; *d*, the fire door; and *e*, an inclined plane surface on which the fuel is thrown when fed into the fire-place. This surface is constructed of fire brick or other suitable material, as is also the bridge *f*, at the further end of the grate. Openings *g, g*, are made at the lower part of the

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bridge, to allow flame from the incandescent fuel to pass to the back of the bridge and up behind it, where the flame will meet with the combustible gases that are passing away over the bridge *f* from the fuel unconsumed. Just at this point atmospheric air to effect the combustion of the gases is admitted from the ash pit through the passage *h* (Fig. 1), the supply of air being regulated by a valve *i* (Fig. 1), which is opened or closed by means of the long rod *j*. In one or both of the side walls of the fire-place, and parallel therewith, is made a horizontal lateral flue *k, k*, which communicates with the fire-place by side openings *l, l, l*, through which the smoke and unconsumed combustible gases are drawn off into the lateral flue *k* by the draught from the chimney. One end of this flue *k* is provided with a door *m*, that access may be obtained thereto for the purpose of clearing out the flue when required. The other end of the flue *k* communicates with the main flue just behind the bridge *f*, as shewn in the plan view, Fig. 3, and the gases conveyed by the flue *k* are therefore brought into contact with the flame from the fire, which, when supplied with oxygen from the atmospheric air that enters by the channel or passage *h*, effectually consumes the smoke and combustible gases, and thereby generates great heat under the boiler.

Having now described my Improved Means of Consuming Smoke and Economizing Fuel in Furnaces, and explained the manner of carrying the same into effect, I claim as of my Invention the means herein shewn and described, or any mere modification thereof, for consuming the smoke and combustible gases evolved from the fuel of fire-places or furnaces, whereby such smoke or gases will be drawn off from the fuel, and brought into contact with and intimately blended or mixed with the flame from the incandescent flue in the presence of oxygen, obtained from the atmospheric air admitted to the flue to promote combustion, as above described.

In witness whereof, I, the said Samuel Frankham, have hereunto set my hand and seal, this Twelfth day of February, in the year of our Lord One thousand eight hundred and fifty-five.

SAMUEL FRANKHAM. (L.S.)

Witness,

J. W. MOFFATT,

66, Chancery Lane.

LONDON:

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